

FORM PTO-1390 (Modified)  
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

989.1020

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/720228

INTERNATIONAL APPLICATION NO.  
PCT/FI99/00528INTERNATIONAL FILING DATE  
June 17, 1999PRIORITY DATE CLAIMED  
June 18, 1998

TITLE OF INVENTION

REEL-UP AND METHOD FOR REELING OF A WEB

DEC 18 2000



APPLICANT(S) FOR DO/EO/US

Jarkko RAITY

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

## Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Letter Re Priority

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) <div style="font-size: 2em; font-weight: bold; margin-top: 5px;">09/720228</div>		INTERNATIONAL APPLICATION NO. <div style="font-weight: bold; margin-top: 5px;">PCT/FI99/00528</div>		ATTORNEY'S DOCKET NUMBER <div style="font-weight: bold; margin-top: 5px;">989.1020</div>	
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21. The following fees are submitted: <b>BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5) ) :</b> <input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$970.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$840.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$690.00</b> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$670.00</b> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$96.00</b> <div style="text-align: right; font-weight: bold; margin-top: 5px;">ENTER APPROPRIATE BASIC FEE AMOUNT =</div>				<b>CALCULATIONS PTO USE ONLY</b> <div style="border: 1px solid black; height: 150px; margin-top: 5px;"></div>	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).				<div style="border: 1px solid black; padding: 2px; width: 50px; margin: 0 auto;"><b>\$0.00</b></div>	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	17 - 20 =	0	x \$18.00	<b>\$0.00</b>	
Independent claims	3 - 3 =	0	x \$80.00	<b>\$0.00</b>	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
TOTAL OF ABOVE CALCULATIONS =				<b>\$1,000.00</b>	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). <input type="checkbox"/>				<b>\$0.00</b>	
SUBTOTAL =				<b>\$1,000.00</b>	
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				<b>\$0.00</b>	
TOTAL NATIONAL FEE =				<b>\$1,000.00</b>	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input checked="" type="checkbox"/>				<b>\$40.00</b>	
TOTAL FEES ENCLOSED =				<b>\$1,040.00</b>	
				Amount to be:	\$
				refunded	
				charged	\$

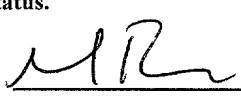
☒ A check in the amount of **\$1,040.00** to cover the above fees is enclosed.  
☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \_\_\_\_\_ to cover the above fees.  
 A duplicate copy of this sheet is enclosed.  
☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **50-0518** A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

**STEINBERG & RASKIN, P.C.**  
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 SIGNATURE  
**Martin G. Raskin**  
 NAME  
**25,642**  
 REGISTRATION NUMBER  
**December 18, 2000**  
 DATE

04/11/01  
 Paid J. H. 166 US  
 Res. No. 44,852



09/720228  
528 Rec'd PCT/PTO 18 DEC 2000

989.1020

**UNITED STATES PATENT AND TRADEMARK OFFICE**

Re: Application of: Jarkko RÄTY  
Serial No.: Not yet known  
Filed: Simultaneously  
For: REEL-UP AND METHOD FOR REELING  
OF A WEB

**PRELIMINARY AMENDMENT**

Commissioner of Patents  
Washington, D.C. 20231

December 15, 2000

Sir:

Prior to examination and calculation of the filing fee, please amend the above-identified application as follows:

**IN THE SPECIFICATION:**

Please amend the specification as follows (reference is made to the lines as numbered).

Page 1, line 2, insert --**FIELD OF THE INVENTION**--;

line 3-7, replace "The present invention ... ..a reel-up." with --The present invention relates to a method for reeling a web around a reeling spool. The invention also relates to a reel-up for a web. The invention also relates to a method for reeling a web around a reel spool by means of said reel-up.--;

line 8, insert --**BACKGROUND OF THE INVENTION**--; and

Page 5, line 37, delete "Thus, it is an aim of the invention".

Page 6, before line 1, insert --**OBJECTS AND SUMMARY OF THE INVENTION**--;

line 1, before "to present a" insert --Thus, it is an object of the invention--;

lines 27 to 34, replace "More precisely, the... ..part of claim 16." with --The present invention relates to a method for reeling a web around a reeling spool. The invention also relates to a reel-up for a web. The invention also relates to a method for reeling a web around a reel spool by means of said reel-up.--

Page 9, line 13, insert --**BRIEF DESCRIPTION OF THE DRAWINGS**--; and

line 33, insert --**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**--.

Page 13, line 16, change "3" to --2a--.

Page 14, line 10, delete "34"; and

line 10, after "pressing roll" insert --34--.

**IN THE CLAIMS:**

Please cancel claims 1-7 without prejudice.

Please amend claims 8-17 as follows.

8. (Amended) Reel-up of a web [which comprises] comprising:

[at least a] reeling means (5) for guiding a web (W) onto a reel spool (11) to thereby form a reel[, and];

supporting structures (2) having a bearing surface for supporting [a] at least one of said reel spool (11) [and the] having a reel being formed [(11)] thereon and[/or] a complete reel (12), [characterized in that the reel-up comprises] and on which said at least one of said reel spool (11) and said complete reel (12) can roll; and

[an assembly of supporting devices, which comprises at least a part of the rolling surface in the upper surface of the supporting structure, such as a [bearer] bearing surface or a corresponding surface (3) on which the reel spool and the roll (11, 12) thereon can roll, and at least a part of]

a slidable supporting surface (44)[, such as the surface of a slide or a corresponding arrangement (4), which] structured and arranged to retain a reel spool (11) thereon, wherein said supporting surface (44) [can be moved] is slidably movable with respect to the reeling means (5), said supporting surface (44) being movable from [the] a functional vicinity of the reeling means (5) to [the] a vicinity of the [bearer] bearing surface of the supporting structure (2).

9. (Amended) Reel-up according to claim 8[ characterized in that] wherein the movable supporting surface (44) and the [rolling] bearing surface are structured and arranged substantially on the same vertical [level] and horizontal planes.

10. (Amended) Reel-up according to claim 8 [or 9, characterized in that] wherein the movable supporting surface (44) is arranged in a slide (4), said slide (4) being structured and arranged to be [which is] supported [to] by the supporting structure (2).

11. (Amended) Reel-up according to claim 8 [to 10, characterized in that] wherein the movable supporting surface (44) is structured and arranged to [be equal in width with the rolling surface, such as the fixed rail section (3)] have a width equal to a width of said bearing surface.

12. (Amended) Reel-up according to claim 10 [or 11, characterized in that the respective surfaces (45) of the rolling surface, such as the fixed rail section (3), and of the movable supporting surface (44)] wherein said movable supporting surface (44) of said slide (4) is provided with a mating surface (45) formed on an end thereof and wherein said bearing surface is provided with a corresponding mating surface formed on an end thereof such [are formed in such a way] that when the slide (4) is brought in contact with the [fixed rail part (3)] said bearing surface, a mating section (45') is formed therebetween, said mating section (45') extending on at least a length substantially in the direction of the [rail (3, 44)] supporting surface (44) and the bearing surface.

13. (Amended) Reel-up according to [any of the claims 8 to 12, characterized in that] claim 8, wherein said supporting surface (44) is [formed as] structured and arranged to be a rolling surface[, such as a bearer surface,] on which the reel spool (11) can roll and move with respect to said supporting surface (44).

14. (Amended) Reel-up according to [any of the claims 8 to 13, characterized in that] claim 8, wherein said supporting surface (44) is structured and arranged to form an extension [to said rail members (3), such as fixed rails or] of said bearing [bearer] surface, [to move] whereby the reel spool (11) [by rolling] can be moved from the supporting surface (44) to said [rail members (3)] bearing surface by rolling.

15. (Amended) Method for reeling a paper web with a reel-up [which comprises at least an arrangement] around a reel spool (R), comprising the steps of:

providing a reeling carriage (33) for supporting [the] a reel during [the] a change of said reel[, such as reeling carriages (33)]; and

providing a pressing device (34) [such as] in the form of a roll attached [thereto] to said reeling carriage[, in which method a web (W) is reeled around a reel spool (R), characterized in that the arrangement such as a] wherein, substantially immediately after said reel change, said reeling carriage [or the like] (33) [supporting the reel (R) at least during the change,] is driven to the vicinity of a reeling means (31) [substantially immediately after the reel (R) change].

16. (Amended) Method according to claim 15, [characterized in that] further comprising the step of:

starting the reeling on the new reel spool (R) [is started] before the reeling carriage [or the like] (33) is driven to the vicinity of the reeling means (31).

17. (Amended) Method according to claim 15 [or 16, characterized in that] further comprising the steps of:

reeling a web onto a support of a primary reeling device (32) for a suitable period of time,  
after the change of said reel takes place, [the reeling is effected on the support of a primary or  
initial reeling device (32) for a suitable period of time], and

driving [wherein during this time] the reeling carriage (33) together with its pressing  
[rolls] device (34) [is driven in] to the vicinity of the reeling means (31) during this period of time.

Please add the following new claims.

- 18. A method for reeling a web (W) in a reel-up, comprising the steps of:
- providing a reel spool (11), each reel spool (11) having a pair of opposed ends;
- providing reeling means (5) for guiding said web (W) on to said reel spool (11), said reel spool (11) and said reeling means (5) defining a reeling nip therebetween;
- supporting said pair of opposed ends of said reel spool (11) on a slidable supporting surface (44) when said reeling means (5) and said reel spool (11) are in a nip closed position;
- forming a reel (R) on said reel spool (11); and
- changing the position of said reel (R) with respect to said reeling means (5), as said reel



(R) is being formed on said reel spool (11).

19. The method according to claim 18, further comprising the step of:

sliding said supporting surface (44) away from said reeling means (5) as said reel (R) being formed on said reel spool (11) grows in diameter.

20. The method according to claim 18, further comprising the step of:

providing a [bearer] bearing surface (3) structured and arranged to receive said reel spool (11) from said supporting surface (44) thereon, wherein said supporting surface (44) is provided with a rolling surface vertically aligned with said [bearer] bearing surface (3) such that said pair of opposed ends of said reel spool (11) can roll from said supporting surface (44) to said [bearer] bearing surface (3).

21. The method according to claim 18, further comprising the step of:

placing an empty reel spool onto said slidable supporting structure (44) at an initial stage of the reeling process.

22. The method according to claim 18, further comprising the steps of:

during a reel spool change situation:

opening said nip closed position by sliding said reel spool (11) away from said reeling means (5); and

transferring said reel spool (11) from said slidable supporting surface (44) to rail members

(3) structured and arranged to receive said opposed ends of said reel spool (11).

23. The method according to claim 18, further comprising the steps of:

during a reel spool change situation:

sliding said slidable supporting surface (44) into an initial position in the vicinity of said reeling means (5); and

transferring a new reel spool on to said slidable supporting surface (44).

24. The method according to claim 18, further comprising the step of:

during a reel spool change situation:

sliding said supporting surface (44), having a full reel spool supported thereon, along rail members (3); and

rolling said full reel spool from said supporting surface to said rail members.--

### REMARKS

The specification has been amended to include section headings at appropriate locations and to more clearly set forth the invention.

Claims 1-7 as originally filed have been canceled and new claims 18-24, essentially commensurate in scope with original claims 1-7, are submitted herewith. No new matter has been added.

Claims 8-17 have been amended to remove multiple dependencies in order to reduce the filing fee and to more clearly define the claimed invention.

The invention is new, useful and non-obvious

An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

STEINBERG & RASKIN, P.C.



Martin G. Raskin  
Reg. No. 25,642

by // [Signature]  
Per - J. McGowan  
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## Reel-up and method for reeling of a web

5 The present invention relates to a method according to the preamble of claim 1 for reeling of a web. The invention also relates to a reel-up for a web according to the preamble of claim 9. Moreover, the invention relates to a method according to the preamble of claim 16 for reeling of a web by means of a reel-up.

10 There are known reel-ups of a paper machine or the like in which the web to be reeled is guided over a reeling cylinder, through a nip formed by the reeling cylinder and the reel being formed, and onto the reel that is being formed. Typically the reel that is being formed is completed around a so-called reel spool which is supported at its ends by means of bearings on so-called reeling rails along which the reel spool and the  
15 roll thereon are capable of rolling by means of bearing housings.

Reel-ups of web-like materials are used to reel a material passed in a continuous web into a tight reel, so that it can be moved to further processing. In the reel-ups of a paper web, a continuous paper web  
20 passed from a paper machine, coating machine or corresponding paper processing apparatus is reeled around a reeling axle, i.e. reel spool, to form a reel. For example in a so-called Pope-reeler, or in a centre-drive assisted Pope-reeler, the finished paper is reeled around the reeling axle after the calender. The web is passed to the reel via a reeling  
25 cylinder arranged rotatable, against which the reeling axle is loaded by means of a loading device located in connection with the reeling axle.

The web is passed to the reeling axle so that it is pressed against the preceding layers of the reel and the mantle surface of the reeling  
30 cylinder. At this point where the web enters in contact with the preceding layers on the reel, the web is, due to the aforementioned loading device, subjected to a certain nip load, linear load. In present-day reel-up types, the reeling axle is also centre-driven, and by means of the torque of the reeling axle it is also possible to affect the  
35 peripheral force of the reel to be reeled. The reeling nip between the reeling cylinder and the reel primarily prevents the access of air to the reel. By controlling the load directed to the web, it is, however, also

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possible to control the tightness of the reel that is being formed, and in addition, the aim is to change the loading during the reeling process so that the tightness of the reel would comply with the quality requirements set by the paper grade and the after-treatment in different sections in the radius of the reel. The reeling process is controlled indirectly by adjusting the reeling parameters (linear load, web tension, peripheral force and reeling force). The adjustment is typically made with a special program. The main aim of the reeling is to reel a continuous paper web to form a reel which fulfills the requirements set by the reeling process and further processing with respect to processibility and thereby the structure of the reel as well as the paper quality. At present, the speeds of paper machines are typically 20 m/s or higher, and naturally, the aim is to attain speeds which are even higher. The reeling apparatus must operate without interruptions and receive the continuous paper web passed from the preceding sections of the paper machine.

When the old reel has become full, the web has to be cut and the winding of the web following the cut-off point around a new reeling axle has to be started. In practice, this takes place in such a way that when the paper roll formed around the reeling axle has accumulated into its full size, a new empty reel is transferred, typically simultaneously and from above the reeling cylinder, onto the surface of the reeling cylinder, while the paper web is left therebetween. The full paper reel is transferred away from the reeling cylinder, and thereafter the paper web is cut with a suitable way and the end of the web following the cut-off point is guided onto the perimeter of an empty reeling axle, onto which the new web begins to accumulate to form a reel. Thereafter the new reeling axle is transferred to a reeling carriage, travelling on separate linear guides, or on top of horizontal reeling rails. The reel that has become full is transferred e.g. by means of a transfer device along the reeling rails to an unloading station, and at the same time a new reeling axle is brought onto the reeling rails. During the initial reeling process the loading is controlled by means of force devices of the initial reeling device, and when the reeling axle has been transferred e.g. to the reeling carriage, the loading is controlled by means of force devices coupled to the reeling carriage, typically by means of pressurized medium operated cylinders.

For example US patent 4634068 discloses a reeling apparatus in which an empty roll is lowered in contact with the reeling cylinder. Furthermore, a separate mention is to be given to the force devices of the initial reeling device in the US patent 4634068, i.e. a separate loading cylinder and a relief cylinder, and when the reeling axle is on top of the reeling rails, to a loading cylinder which presses the axle against the reeling cylinder. The used hydraulic cylinder is coupled e.g. to swinging arms articulated turnable in the frame of the reel-up.

The properties of the web affect the quality of the reel. For example, the most common reeling problem caused by a bad web tension is the wrinkling of the slack parts of the web, typically the edges, in the reeling nip or nips, because the web is longer by the slack section than by the tight section. The slackness of the edges also causes a poor edge zone in the reel and thereby edge reels of poor quality which are difficult to be reeled by means of slitte winders, and whose problems occur when the rolls are used, for example in printing machines. If the web tension profile varies a great deal or is e.g. uneven, it may lead to the use of high web tension just in case, which stresses the tight sections in the web more and increases the number of web breaks.

In a control circuit of a reel-up which is disclosed in the US patent 5285979, the loading takes place in the frame of the reel-up by means of a carriage moving along linear guides in the frame of the reel-up, to which carriage the loading force device is coupled. In the publication, the reeling axle is arranged in a swinging arm articulated turnable in the carriage, which swinging arm, however, is stationary during the loading and is only used when the reel that has become full is removed by turning the swinging arms to the direction of removal by means of special unloading cylinders. The aforementioned force device is used to supply the desired loading force or to transfer the reeling axle further away from the reeling cylinder as the size of the roll grows. In the initial reeling device this can also take place by means of separate relief cylinders, as is presented in the US patent 4634068. By means of relief cylinders it is possible to compensate the effect of gravity on the reeling cylinder, and thus they are used for so-called profiling. It is also

common that in the initial reeling device the loading, relieving and adjustment of the position of the reeling axle with respect to the reeling cylinder are effected by means of one double-acting pressurized medium operated cylinder.

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The US patent 5285979 also describes the use of a hydraulic cylinder separately in a situation where the reeling cylinder and the growing reel are kept within a distance from each other, wherein a photocell is used to produce the signal effecting the transfer. The actual loading force is affected by several factors, such as friction caused by the motion of the force device as well as kinetic friction of the structure supporting the reeling axle when it is moved. It should also be noted that the current regulator means is a servo valve which controls the cylinder functioning as a force device, whereas the cylinder controls only one of the two carriages.

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There are also known reel-ups such as the one presented in EP patent 604558 and in the related US patent 5393008. The patent discloses carriages arranged movable linearly in guides parallel to the reeling rails, the position of the carriages being determined on the basis of hydraulic cylinders coupled between the frame of the reel-up and the carriages. Thus, by means of these hydraulic cylinders, the location of the reeling axle is at the same time also adjusted with respect to the reeling cylinder. The carriages are provided with separate pressing devices which press the bearing housings located at the ends of the reeling axle and resting on the reeling rails with an adjustable force towards the reeling cylinder to produce the necessary nip pressure. On the other side of the bearing housing, the carriages are also provided with positioning devices by means of which the location of the reeling axle in the carriage can be adjusted more accurately.

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In the above-described cases to control e.g. the reeling carriage, the initial reeling device and the loading device, hydraulic cylinders are typically used in pairs to control the different ends of the reeling axle. Thus, the control of the ends is arranged for example by means of an integrated carriage or a carriage arranged in connection with each end to move independently. Furthermore, it is thus possible to arrange the

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linear load between the machine reel and the reeling cylinder to vary also in the transverse direction of the paper web. On the basis of the above-described facts it is obvious that for the sake of reliable function, the control of the force devices must also be reliable and simple.

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There are, however, considerable problems and drawbacks related to the prior art. Thus, such reel-ups entail factors which disturb the reeling process. The rolling surfaces of the reel spools which thus function as surfaces transmitting e.g. supporting force in the support of the reel during the reeling, are subjected to considerable stress when the reel spools are manipulated and driven. These surfaces can also be damaged with time, which impairs the situation even more. Even though the surfaces remained in a relatively good shape, friction is always produced in the rolling which friction is also affected by the mass of the constantly growing reel. This friction also affects the control of the reeling process, such as the adjustment of the linear load.

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Thus, in the reeling of a web, particularly as the reel is accumulated, the most significant disturbance factors in the linear load and its control include the changes in the frictions produced as a result of the transfer of the machine reel, i.e. the reel spool.

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The essential steps of the reeling process include the change of the reel and the act of stopping the rotary movement of the reel. Thus, as the reel-up in question is a continuous reel-up, the reel has to be removed from the nip contact i.e. from the reeling cylinder constituting the actual reeling nip, at least when stopping the reel. Thus, it is advantageous to form a separate nip by means of a pressing device to bind the surface layers of the reel and to prevent the access of air between the layers of the reel. A pressing device of this kind, such as a roll is, however, impractical with respect to the movement of the operating personnel, because it is typically placed slightly above the machine level. Such a pressing device can be placed and supported by means of an apparatus, such as a slide structure or guides, which is movable separately, wherein it can be driven to the front, i.e. in the vicinity of the reeling cylinder. Such a solution is, however, complicated, and it increases the sequence times. Thus, it is an aim of the invention



to present a new solution for this problem, with which solution the drivability of the reel-up is better than before and the structure is simpler.

5 It is an aim of the present invention to eliminate the drawbacks of prior art and to attain an entirely new solution with which the control of the reeling process is improved. The present invention provides a completely new kind of possibility to control the entire reeling process especially in reel-ups in which the reeling to a new reel spool is started  
10 with a first support apparatus, such as a so-called initial reeling device, and the reeling is continued with a second support apparatus, i.e. the member supporting/loading the reel spool and the reel is changed during the reeling.

15 Also in such reel-ups in which, at the change situation or when a full reel is stopped, the reel has to be removed from the actual reeling nip (even though a second pressing device is alternatively brought in nip contact with the reel) without moving the reel itself, the present invention provides an effective solution for controlling the reeling  
20 process comprehensively.

The invention is based on the idea that the reel spool rests and/or it is supported substantially during the entire "nip closed" reeling process of the reeling cylinder substantially in its position with respect to the same  
25 supporting surface.

More precisely, the method for reeling of a web according to the invention is primarily characterized in what will be presented in the characterizing part of claim 1. More precisely, the reel-up of a web  
30 according to the invention is primarily characterized in what will be presented in the characterizing part of claim 9. More precisely, the method according to the invention for reeling of a web with a reel-up is primarily characterized in what will be presented in the characterizing part of claim 16.

35 Within the scope of the present invention, a paper machine refers, in addition to the actual paper machine, to paperboard and pulp drying

machines and other corresponding machines as well as further processing machines for paper, such as coating machines or calenders, etc., and paper refers to all web-like materials that can be manufactured with all these devices.

5

According to a first preferred embodiment of the invention, a reel-up of a paper machine comprises at least a reeling cylinder supported rotatably and equipped with a drive, or a corresponding reeling means constituting a supporting surface, over which the web travels during the reeling and which forms a nip with the reel that is being formed at least for a part of the duration of the reeling. Corresponding reeling means guiding the web include e.g. a belt, a wire loop or a belt roll system. According to the invention, substantially immediately after or before the change of the reel (i.e. at least within a period of time which does not have a substantially harmful effect on the progress of the reeling), which can be conducted with methods and devices known as such, an empty reel spool onto which the reeling is transferred is brought in contact with the supporting surface on which the reel spool rests and/or is supported substantially during the entire reeling process substantially in its position with respect to the same supporting surface. According to the invention, this supporting surface is arranged in a means, such as a slide or the like, which is arranged movable on a supporting structure placed in the vicinity of the reeling cylinder, which supporting structure advantageously extends in the travel direction of the paper and is arranged in the vicinity of both ends of the reeling cylinder.

25

According to the invention, during the reeling process the reel spool and the roll located or formed thereon is thus supported by a supporting surface which is arranged to move away from the reeling cylinder as the reel to be reeled accumulates. Thus, the reel spool does not roll during the reeling, wherein the nip between the reel being formed and the reeling cylinder is kept closed, but the reel spool is transferred in a controlled manner on the support of the slide and advantageously by means of a separate reeling carriage, if necessary.

35

The reel-up according to a preferred embodiment of the invention comprises at least a reeling cylinder or the like as well as supporting

structures arranged perpendicular to the cylinder, in the vicinity of the ends of the same, to support the reel spool and the reel that is being formed during and after the reeling. According to one embodiment of the invention, the supporting structures for supporting the reel spool and the reel that is being formed comprise an assembly of supporting devices which comprises at least a part of the bearer surface in the upper surface of the supporting structure or a corresponding surface on which the reel spool and the roll located thereon can roll, and at least a second part of a supporting surface, such as a slide or a corresponding arrangement, which supporting surface is movable with respect to the reeling cylinder from the operating vicinity of the reeling cylinder to the vicinity of the bearer surface or a corresponding surface in the supporting structure. Advantageously, the movable supporting surface and the bearer surface or the corresponding surface are substantially on the same vertical level. According to the invention, the reel spool and the roll formed thereon are supported by means of a supporting surface movable during the reeling process, and during and/or after the reel change the complete reel can be rolled via the bearer surface or a corresponding surface.

As far as the main principle of the reeling process is concerned, it is possible to utilize known methods and devices. At the stage of starting the reeling, when reeling onto a new reel spool, it is, according to the invention, possible to lower a new reel spool directly on a movable supporting surface, such as a slide, which has already been guided in the initial position (to the front). When the reel accumulates, the reel spool is not, according to the invention, rolled on the rails, but it is moved in the slide on linear guides when necessary. Thus, the reel spool is supported during the entire reeling process substantially in its position with respect to the same supporting surface. At the final stages of the "nip closed" reeling, the slide containing the supporting surface has moved in connection with stationary rails, wherein they are coupled to each other in such a way that the reel spool and the roll can be rolled over the interface therebetween. When the reeling nip between the reeling cylinder and the reel is opened in a change situation, the reel spool is transferred away from the movable supporting surface to rail members, such as stationary rails or the like, wherein the movable

supporting surfaces are transferred to the front to the initial position in the vicinity of the reeling cylinder, wherein a new reel spool can be lowered directly on top of the movable supporting surface.

- 5 By means of the invention considerable advantages are achieved. With the solution according to the invention, the conditions can be controlled significantly better as the frictions are practically constant and thus the conditions are stabilized by means of the invention. With the method according to the invention, it is possible to efficiently control the reeling process with the reel changes and to minimize the disturbance factors. The reel-up according to the invention becomes safer and more user-friendly.

10 In the following, the invention will be described in more detail with reference to the appended drawings, in which:

- 15 Fig. 1 shows a side-view of a prior art reel-up of a web,
- 20 Fig. 2a shows as an example a side view of an embodiment of a solution according to the invention,
- 25 Fig. 2b shows as an example a top view of an embodiment of a solution according to the invention, cut at point A—A of Fig. 2a
- 30 Fig. 3 shows a perspective view of a slide according to a preferred embodiment of the invention, including the supporting surfaces of the slide, and
- 35 Figs. 4a-4e show a schematical side view of a reeling solution according to the invention and a method in connection of the reeling.

Fig. 1 is a reduced principle view showing in a side view a reel-up of a paper web, known as such. As is well known, the reel-up is provided with a rotatable reeling cylinder C, by means of which a continuous paper web W passed from a paper machine, coating machine or

another paper processing apparatus is reeled around a reeling axle T1 to form a machine reel R. The reel R is loaded against the reeling cylinder C by applying a force F1 of desired strength, directed towards the reeling cylinder C, to the reeling axle T1. This produces a reeling nip N1 between the reel R and the reeling cylinder C, where a nip pressure of particular strength prevails as a result of the loading. The reeling axle T1 is advantageously also provided with a centre-drive, wherein the reel-up in question is a centre-drive assisted Pope reel-up, in which the torque of the reeling axle T1 can also be used to affect the quality of the reel R being formed. Fig. 1 also shows a reeling axle T2 brought in connection with the reeling cylinder C by means of an initial reeling device of the reel-up. The reeling axle T2 is loaded against the reeling cylinder C by applying a force F2 of desired strength directed towards the reeling cylinder C, to the reeling axle T2. This produces a reeling nip N2 between the reeling axle T2 and the reeling cylinder C, where a nip pressure of particular strength prevails as a result of the loading. In this case, the nip pressure is also affected by the weight of the reeling axle T2.

The reeling cylinder C is pivoted in a way known as such to a frame K1 of the reel-up, stationary with respect to a supporting base, such as the floor level of a factory. The reeling axle T1, in turn, is pivoted in a way known as such on top of reeling rails K2 on the support of which the ends of the reeling axle T1 rest at the bearing housings, and which at the same time support the weight of the reel R. By means of supports V1 of a carriage V, pivoted in a way known as such and moving in a guide K3 located in the frame K1, the reeling axle T1 and at the same time the reel R are moved in the longitudinal direction (arrow X) of the reel-up. The carriage V also moves in the longitudinal direction of the reel-up and it is of such a type that excluding a weight possibly received by the reeling cylinder C, the reeling rail K2 supports the entire weight of the reeling axle T1 and the reel R. The carriage V is arranged in a way known as such to move in linear direction with respect to the reeling cylinder C to transfer the reel R, and the motion is possible in both directions; in other words, if necessary, the carriage V can be moved back and forth (arrow X) by means of double-action cylinders. The carriage V can move on top of fixed linear guides or it can be

guided by rails. The support V1 or its parts, articulated in the carriage V to turn with respect to a pivot located therein, can also be transferred by means of separate hydraulic cylinders (not shown in the drawing), e.g. to move the completed reel away from the carriage V.

5

With reference to Fig. 1, to attain the desired nip load (nip pressure), the reel R is loaded against the reeling cylinder C with a predetermined loading force F1 by affecting the reeling axle T1 by means of force devices VL1 and VL2, hereinafter also called as an actuator VL1 or VL2. A loading force F2 is attained in a similar manner by means of force devices VL11 and VL12. The force devices VL1 and VL2, one on each side of the reel R in a similar manner as force devices VL11 and VL12, affect the bearing housings of the reeling axle T1 in a way known as such, which bearing housings are typically located in the carriage V or on the support of reeling rails. Hereinafter, the term actuator VL11 or VL12 will also be used for the force device VL11 or VL12. The reeling axle T1, in turn, is transferred further away from the reeling cylinder C when the reel R grows, i.e. when the radius of the reel R is increased, by moving the carriages V with the force devices VL1 and VL2. When the reeling proceeds, the desired nip load is attained by means of force devices VL1 and VL2, and the carriage V is moved as the thickness of the reel is increased. The reeling carriages V have to be moved in a synchronized manner, which sets special demands for the control circuit and the function of the force devices.

25

Fig. 2a is a skeleton diagram of the reel-up according to the invention with a reeling slide and a reeling carriage. The reel-up 1 comprises supporting structures 2 located behind a reeling cylinder 5 in the travel direction of the web W. The supporting structures 2 are composed of structures located in the vicinity of both ends of the reeling cylinder. The supporting structures 2 for supporting the reel spool and the roll (reel 11 or 12 in Fig. 2a) that is being formed, comprise an assembly of supporting devices which comprises at least a part of the bearer surface or a corresponding surface 3 in the upper surface of the supporting structure, on which the reel spool and the roll thereon can roll, and at least a second part of a supporting surface 44, such as a slide 4 or a corresponding arrangement, which supporting surface can

35

be moved with respect to the reeling cylinder from the functional vicinity of the reeling cylinder 5 to the vicinity of the bearer surface of the supporting structure, or a corresponding surface 3. Thus, during the "nip closed" reeling, the reel spool rests on the supporting surface

5 movable by its bearing housing in such a way that their mutual location remains substantially unaltered, while the supporting surface is moved at the same time in accordance with the increase of the diameter of the reel. Advantageously, the movable supporting surface 44 and the bearer surface or a corresponding surface 3 are substantially on the

10 same vertical level. According to the invention, the reel spool and the roll formed thereon (reel 11 in Fig. 2a) are supported by means of the supporting surface 44 movable during the reeling process, and during and/or after the reel change the complete reel (reel 12 in Fig. 2a) can be rolled from the movable supporting surface to the bearer surface or

15 a corresponding surface and further by means of the bearer surface or a corresponding surface.

Fig. 3 shows an embodiment of the slide 4 according to the invention. The slide is supported to a supporting structure 2 by means of guides

20 41 and 42, which are arranged in such a way that one of them is on the vertical surface of the supporting structure (supporting structure 2 in Fig. 2a) and the other on the upper surface of the same, wherein the force control is optimal. The reel that is being formed weighs tens of tonnes, and thus the structure has to be very steady and strong. The

25 slide 4 comprises a supporting surface 44 which is, according to the invention, substantially as wide as a fixed rail section 3, which is here pictured close to the slide, even though it is, in fact, further apart. The respective surfaces 45 of the fixed rail section 3 and the supporting structure 44 of the slide have such a shape that when the slide is

30 brought in contact with the fixed rail section, a connective seam section 45' is formed, extending at least a length substantially in the direction of the rail, which connective seam section 45' can also lie in a particular angle with respect to the fixed rail section. Fig. 2b shows a partial view of a second embodiment of the connective seam 45'. Fig. 2b also

35 shows end damping elements 45'' such as rubbers, for softening the connective action. The slide 4 has such a shape that the supporting surface comprises a camber 46 in the end by the reeling cylinder.

Furthermore, the slide is also provided with a space 47 for a locking jaws of the reel spool. The slide also comprises mechanical locking devices for locking the reel spool in connection with the slide.

5 The slide is arranged movable on linear guides 41 and 42, which can support the mass of the entire machine reel. The slide is provided with e.g. an pressurized air cylinder control 43, by means of which it can e.g. be restored to the initial position (to the front) for a new reel spool. The supporting surface of the reeling slide 4 can also be placed in an angle, 10 which is e.g. 1 to 3°, wherein part of the linear load is produced with the mass of the reel spool itself. The path of motion of the slide is arranged in such a way that it is sufficient for the reeling of a maximum size machine reel. The slide can also be arranged to be supported with one guide.

15 In the situation of Fig. 3, the new reel spool 11 is lowered on the slide 4, and the full reel 12 has been delivered to be supported by the fixed rail section 3. The reel change is conducted and the reeling is continued on the support of the slide. According to the invention, the entire reeling process with the nip of the reeling cylinder closed is conducted without rolling the reel spool on the rails. In a change situation where the full reel is transferred on the support of the fixed rail section, the time used for reeling onto the full reel is so short that it is not substantially necessary to roll the reel spool during the reeling. In the "nip open" 20 reeling, a separate pressing device is brought in contact with the reel.

Figs. 4a to 4e also show the principle of the method according to the invention by utilizing only those parts in the reel-up of a paper web which are essential in view of the invention. On the basis of the description, it is, however, possible to apply the invention. Figs 4a to 4e 30 schematically illustrate a reel-up 30 of which only some of the components are shown for the sake of clarity. With the reel-up, the web W travelling from a paper machine is reeled to form a reel R. The reels are formed around reel spools and the reel spools are advantageously provided with centre-drives. During the reeling, the reel that is being formed is supported with an apparatus, reeling carriages 33, which 35



comprise means 36 for supporting the reel spool, such as locking jaws and/or controllers.

5 According to Fig. 4a, the reel formed during the reeling accumulates, wherein the reel spool and the roll are moved with respect to the reeling cylinder 31 according to the need. Here, the transfer of the reel is described, but it is also possible to move the reeling cylinder and keep the reel that is being formed in its place. According to Fig. 4b, the reel being formed is detached from the nip contact with the reeling cylinder 10 31, wherein an auxiliary nip 34 is formed with a pressing roll. According to the invention, the pressing roll 34 is coupled to the reeling carriage to be moved in a synchronized manner, and it is advantageously directly attached to the reeling carriage or to a member 37, such as a supporting bar or the like, located in connection with the same. It should 15 be understood that both ends of the reel (front side and driving side) are provided with similar kinds of solutions. The pressing roll 34 is arranged to be movable in a supporting bar 37, wherein it can perform a linear motion. The motion of the pressing roll and its loading against the reel is effected by means of a force device 35, which can be a 20 hydraulic cylinder or a corresponding cylinder. The method of driving the reel-up according to Figs. 4a to 4e, is implemented in the following way. Primarily, it is essential that the arrangement 33 supporting the reel at least during the change, such as a reeling carriage or the like, is driven to the vicinity of the reeling cylinder substantially immediately 25 after the reel change, wherein the "home station" of the reeling carriages and the pressing device, advantageously a roll attached thereto, is in the front in the vicinity of the reeling cylinder. According to Fig. 4b, the pressing roll supported to the reeling carriage at the change situation is driven into nip contact with the reel by means of the force 30 device 35. When the change has been conducted, and the full reel is at least mainly stopped (wherein the auxiliary nip on the roll 34 can be opened), the controllers and/or locking jaws 36 of the reeling carriage are lowered down, and the reeling carriage and thereby also the pressing roll are driven to the vicinity of the reeling cylinder according to 35 Fig. 4c. At the same time, the reeling is already in process, e.g. by means of an initial reeling device 32. Here, the initial reeling device is arranged to be turnable in the vicinity of the reeling cylinder, but it can

also be a device functioning primarily in linear motion and carrying the reel spool "downwards from an upper position". The reeling is effected for a suitable period of time on the support of the initial reeling device according to Fig. 4c, and during this time the reeling carriage with its pressing rolls is driven to the vicinity of the reeling cylinder, wherein the area A between/behind the supporting structures/reel-up is free, and it is possible to move therein without being hampered by the mechanisms of the pressing roll and the reeling carriage. In a situation according to Fig. 4d, the support as well as the loading of the reel are transferred from the initial reeling device 32 to the reeling carriage 33. In Fig. 4d, a new reel spool is also transferred by means of the initial reeling device to the vicinity of the reeling cylinder, and in this situation the reel has also had time to grow. Here, the pressing roll is still detached from the nip contact, but it can be driven in contact with the surface of the reel when necessary by means of the force device 35. Instead of the roll 34 it is also possible to use a so-called brush pressing device 35, which is shown in Figs. 4a to 4e. Figs. 4a to 4e show a method according to the invention applied in connection with the supporting surface 44 and the slide 4 according to the invention, wherein the situation in the transfer of the slide 4 shown in Fig. 4e, precedes the situation of Fig. 4c, so that a new reel spool could now be lowered with the initial reeling device onto the supporting surface 44, and the reeling could be continued for a while by means of the initial reeling device. It is obvious that the method according to the invention can also be applied in connection with a reel-up according to Fig.1, equipped with a continuous rail-like rolling surface K2.

It is obvious for anyone skilled in the art that the invention is not restricted solely to the embodiment presented above, but it can vary within the scope of the claims.

Claims:

1. Method for reeling of a web, in which method a web (W) is reeled around a reel spool (11) via a reeling nip formed by the reel spool (11) and a reeling means (5), the reel that is formed on the reel spool (11) is supported at least by the ends of the reel spool (11), and as the reeling proceeds, the position of the reel being formed and the position of the reel spool (11) are changed with respect to the means (5) guiding the web (W), **characterized** in that the reel spool (11) rests and/or is supported substantially during the entire said "nip closed" reeling process of the reeling means (5) substantially in its position with respect to the same supporting surface (44).
2. Method according to claim 1, **characterized** in that the supporting surface (44) to which the reel (11) that is being formed is supported, is moved away from the reeling means (5) when the reel (11) to be reeled grows.
3. Method according to claim 1 or 2, **characterized** in that the reel spool (11) rests and/or is supported substantially in its position with respect to said supporting surface (44) which is formed as a rolling surface, such as a bearer surface, on which the reel spool (11) can move by rolling with respect to said supporting surface (44).
4. Method according to any of the claims 1 to 3, **characterized** in that at the initial stage of the reeling a new reel spool (11) is lowered onto the movable supporting surface (44).
5. Method according to any of the claims 1 to 4, **characterized** in that in the change situation the reeling nip between the reeling means (5) and the reel (11) is opened and the reel spool (11) is transferred from the movable supporting surface (44) to rail members (3), such as fixed rails or the like (3).
6. Method according to any of the claims 1 to 5, **characterized** in that in the change situation the movable supporting surface (44) is transferred into the initial position in the vicinity of the reeling means (5)

and the new reel spool (11) is lowered on top of the movable supporting surface (44).

5 7. Method according to any of the claims 1 to 6, **characterized** in that in the change situation the movable supporting surface (44) is transferred in connection with the fixed rails or the like (3), and the reel spool (11) is rolled along said supporting surface (44) to the rail members (3).

10 8. Reel-up of a web which comprises at least a reeling means (5) for guiding a web (W) onto a reel (11), and supporting structures (2) for supporting a reel spool and the reel being formed (11) and/or a complete reel (12), **characterized** in that the reel-up comprises an assembly of supporting devices, which comprises at least a part of the rolling surface in the upper surface of the supporting structure, such as  
15 a bearer surface or a corresponding surface (3) on which the reel spool and the roll (11, 12) thereon can roll, and at least a part of a supporting surface (44), such as the surface of a slide or a corresponding arrangement (4), which supporting surface (44) can be moved with respect to the reeling means (5) from the functional vicinity of the  
20 reeling means (5) to the vicinity of the bearer surface of the supporting structure (2).

25 9. Reel-up according to claim 8 **characterized** in that the movable supporting surface (44) and the rolling surface are arranged substantially on the same vertical level.

30 10. Reel-up according to claim 8 or 9, **characterized** in that the movable supporting surface (44) is arranged in a slide (4) which is supported to the supporting structure (2).

35 11. Reel-up according to any of the claims 8 to 10, **characterized** in that the movable supporting surface (44) is arranged to be equal in width with the rolling surface, such as the fixed rail section (3).

12. Reel-up according to claim 10 or 11, **characterized** in that the respective surfaces (45) of the rolling surface, such as the fixed rail section (3), and of the movable supporting surface (44) are formed in

such a way that when the slide (4) is brought in contact with the fixed rail part (3), a section (45') is formed, extending on at least a length substantially in the direction of the rail (3, 44).

- 5      13. Reel-up according to any of the claims 8 to 12, **characterized** in that said supporting surface (44) is formed as a rolling surface, such as a bearer surface, on which the reel spool (11) can roll and move with respect to said supporting surface (44).
- 10     14. Reel-up according to any of the claims 8 to 13, **characterized** in that said supporting surface (44) is arranged to form an extension to said rail members (3), such as fixed rails or bearer surface, to move the reel spool (11) by rolling from the supporting surface (44) to said rail members (3).
- 15     15. Method for reeling a paper web with a reel-up which comprises at least an arrangement supporting the reel during the change, such as reeling carriages (33) and a pressing device (34) such as a roll attached thereto, in which method a web (W) is reeled around a reel spool (R), **characterized** in that the arrangement, such as a reeling carriage or the like (33) supporting the reel (R) at least during the change, is driven to the vicinity of a reeling means (31) substantially immediately after the reel (R) change.
- 20     16. Method according to claim 15, **characterized** in that the reeling on the new reel spool (R) is started before the reeling carriage or the like (33) is driven to the vicinity of the reeling means (31).
- 25     17. Method according to claim 15 or 16, **characterized** in that after the change the reeling is effected on the support of a primary or initial reeling device (32) for a suitable period of time, wherein during this time the reeling carriage (33) with its pressing rolls (34) is driven in the vicinity of the reeling means (31).
- 30

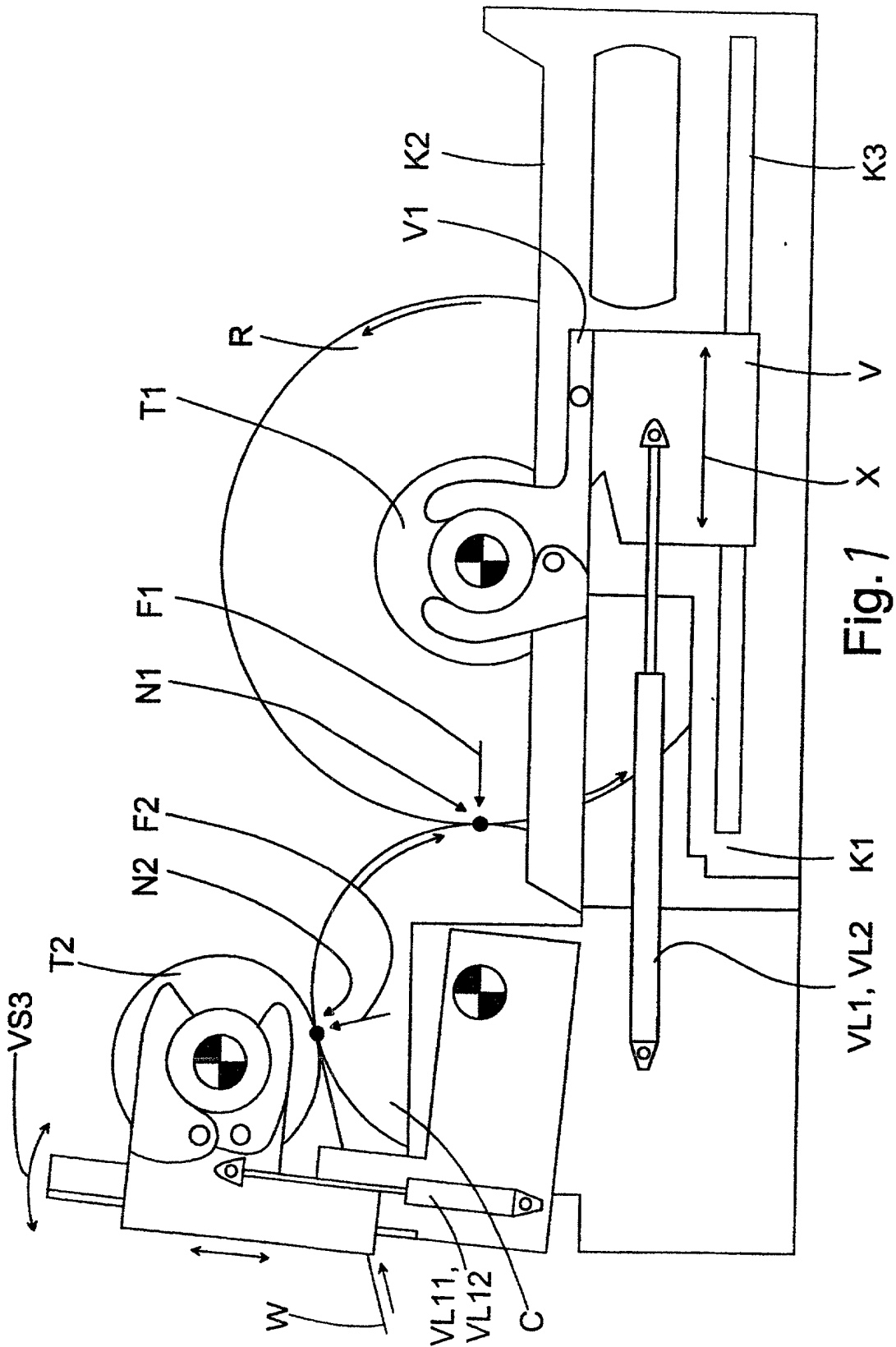


Fig. 1

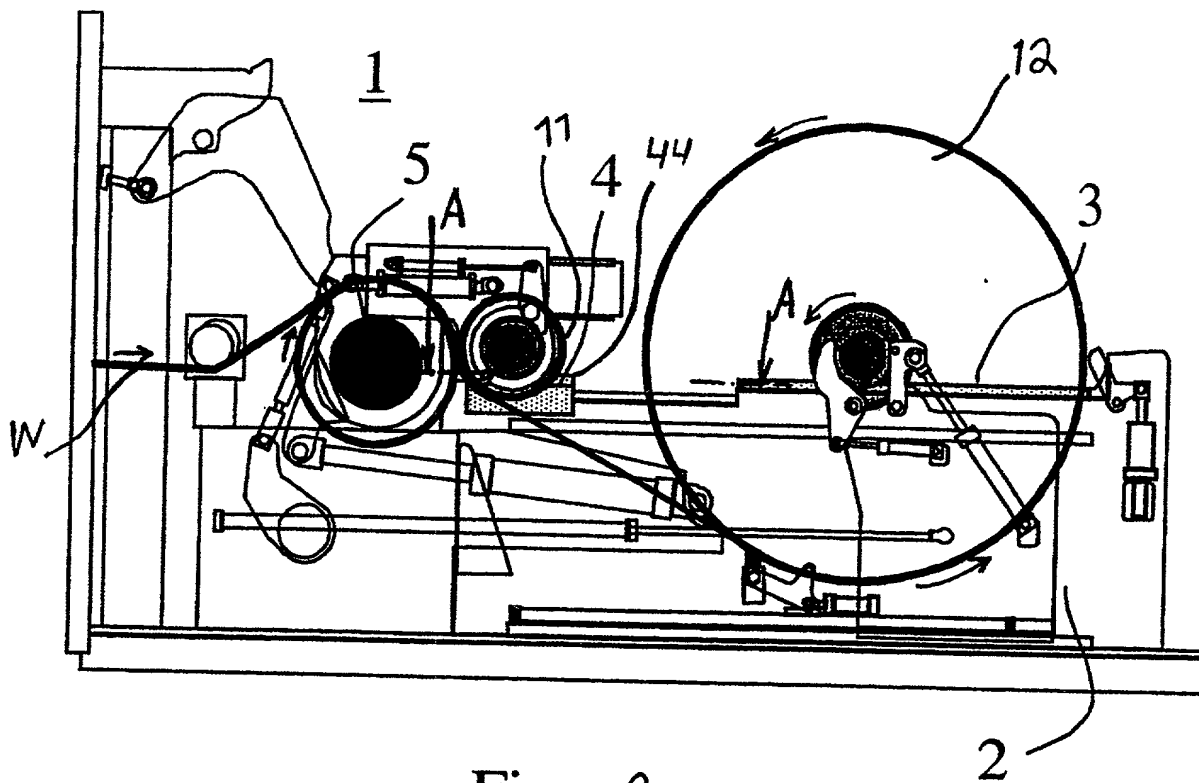


Fig. 2a

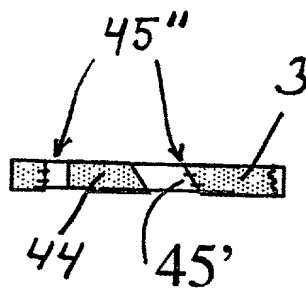
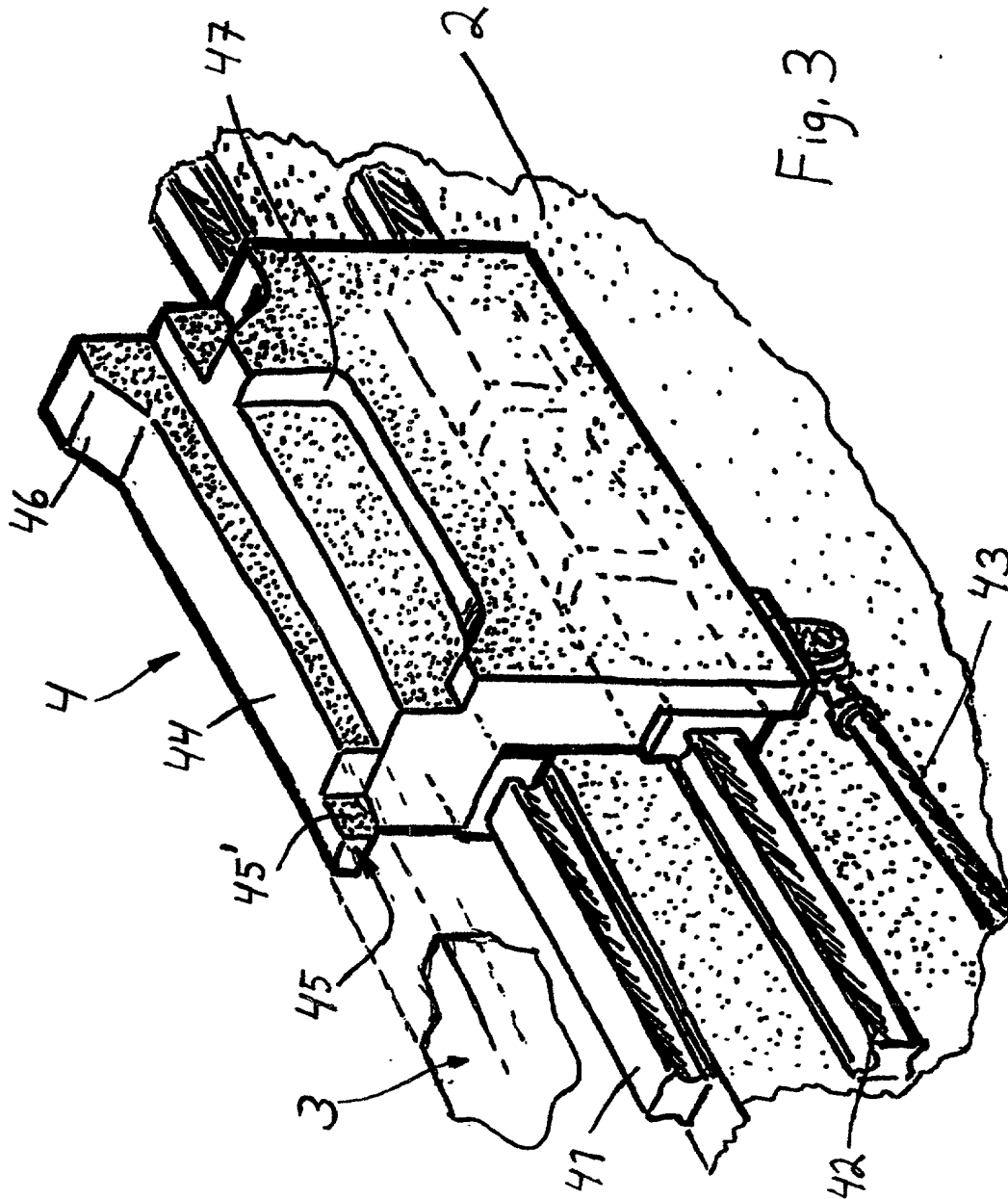
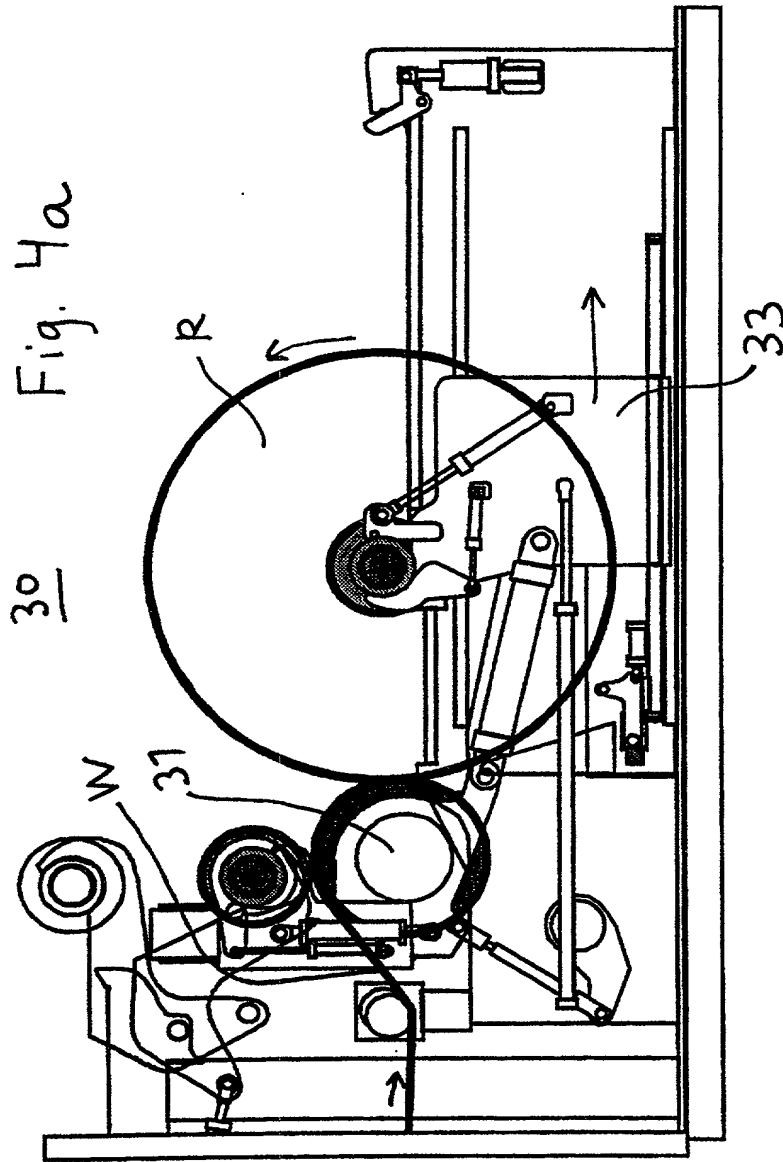
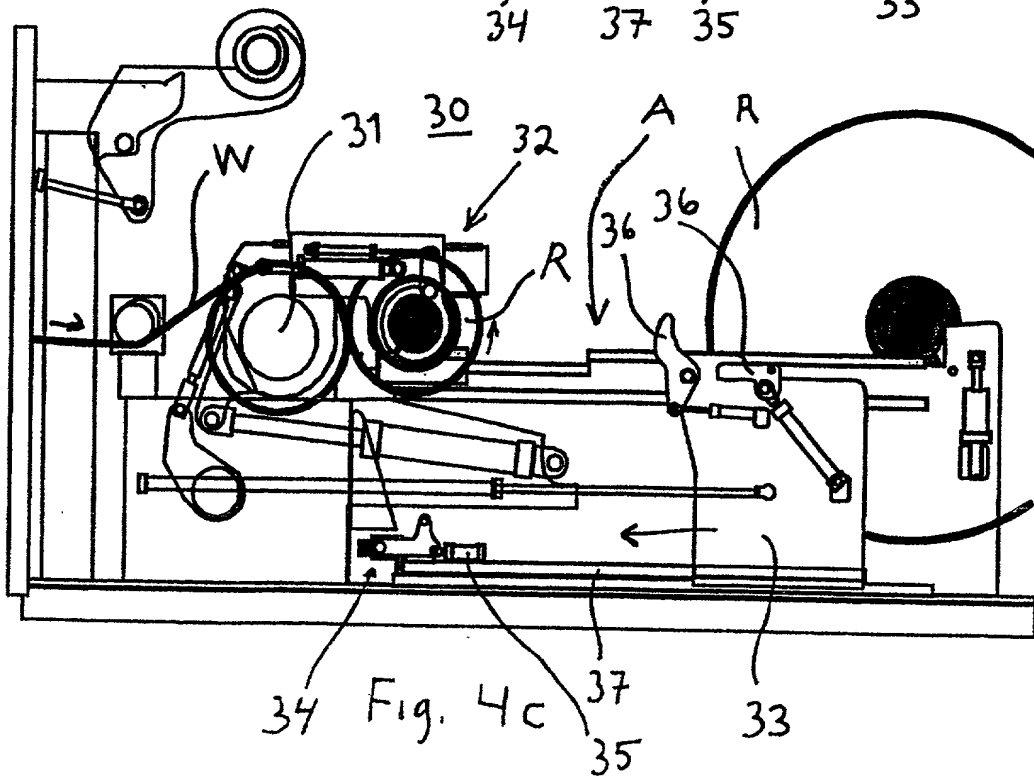
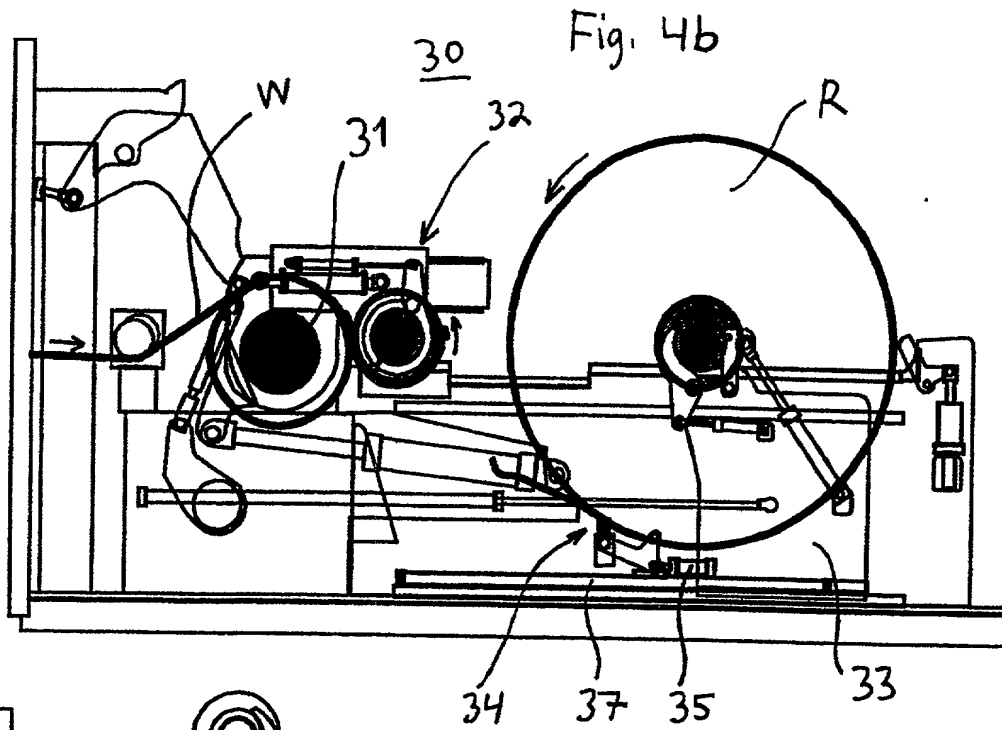


Fig. 2b









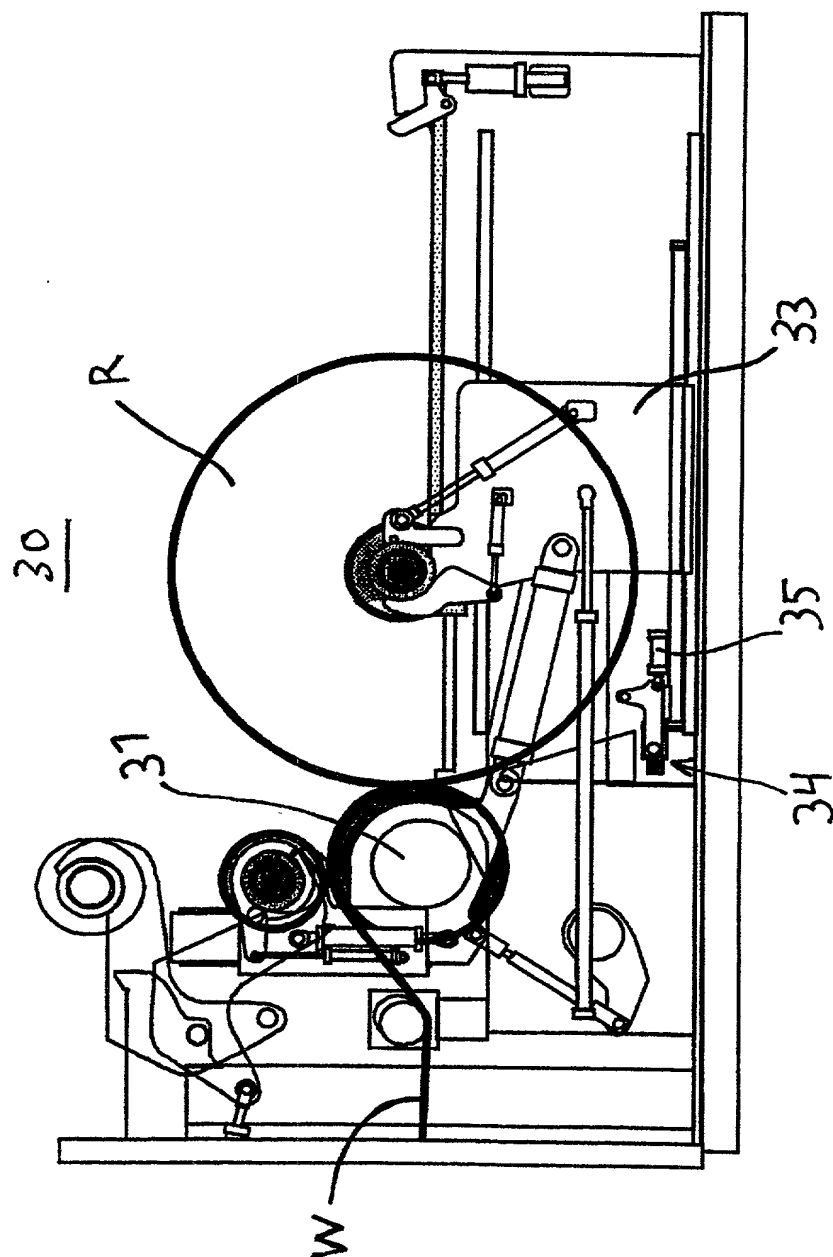


Fig. 4d

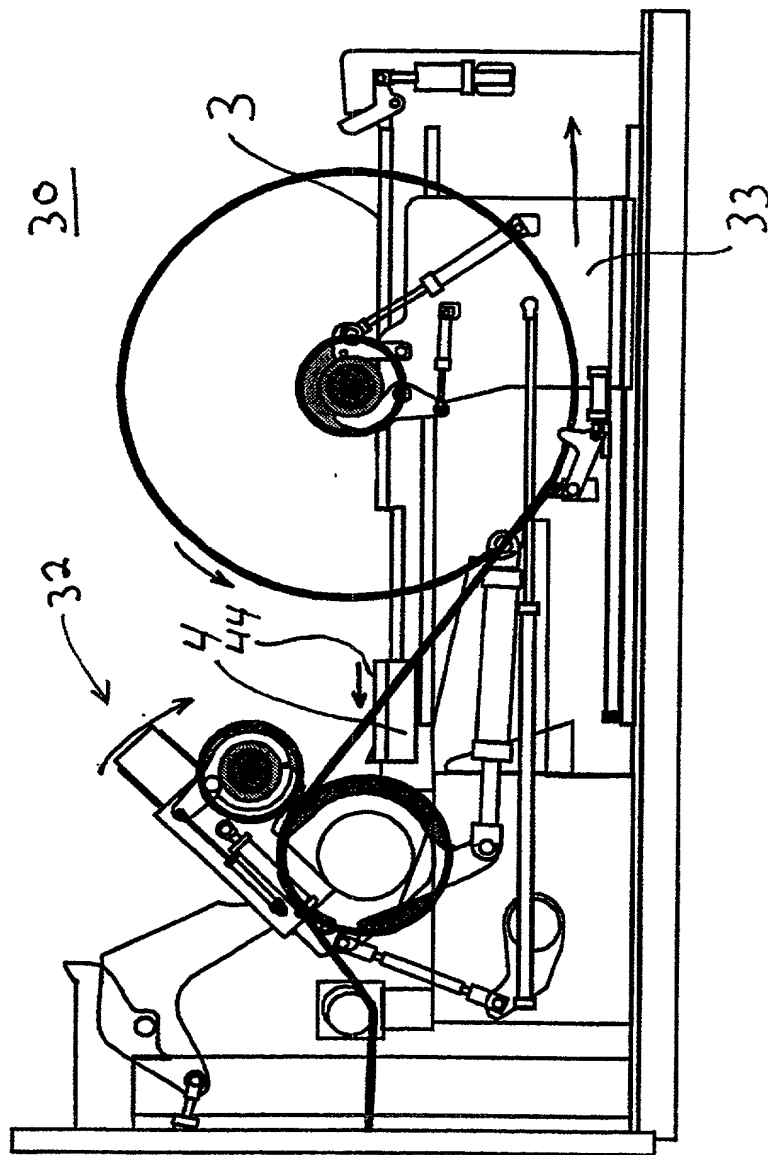
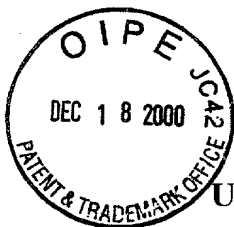


Fig. 4e

**DECLARATION AND POWER OF ATTORNEY FOR  
UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)**

- ☒ Declaration submitted with initial filing
- ☐ Declaration submitted after initial filing (surcharge (37 CFR 1.6(e) required))

First Named Inventor: Jarkko RÄTY

COMPLETE IF KNOWN:

Application Number: \_\_\_\_\_

Filing Date: \_\_\_\_\_

Group Art Unit: \_\_\_\_\_

Examiner Name: \_\_\_\_\_

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**Reel-up and method for reeling of a web**

(Title of the Invention)

the specification of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YY) June 17, 1999 as United States Application Number or PCT International Application Number PCT/FI99/00528 and was amended on (MM/DD/YY) \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above. I acknowledge the duty to disclose information which is material to patentability of this application as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YY)	Priority Not Claimed	Certified Copy Attached?	
				Yes	No
981427	Finland	June 18, 1998			<b>X</b>

I hereby claim the benefit under 35 U.S.C 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YY)

I hereby claim the benefit under 35 U.S.C 120 of any United States application(s), or 365(c) of any PCT International application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application

U.S. Parent Application or PCT Parent Number	Parent Filing date (MM/DD/YY)	Parent Patent Number (if applicable)
PCT/FI99/00528	June 17, 1999	

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

☒ Customer Number 21831

Direct all correspondence to:

☒ Customer Number 21831

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**NAME OF SOLE OR FIRST INVENTOR:**

Given Name (first and middle [if any])

Family Name or Surname

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Inventor's Signature

Date

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Given Name (first and middle [if any])

Family Name or Surname

Jussi

LUNDBERG

Inventor's Signature

*Jussi Lundberg*

Date

15.10.2000

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300 NAME OF ADDITIONAL JOINT INVENTOR, IF ANY:

Given Name (first and middle [if any])

Family Name or Surname

Pekka

RUHA

Inventor's Signature

*Pekka Ruha*

Date

25.10.2000

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